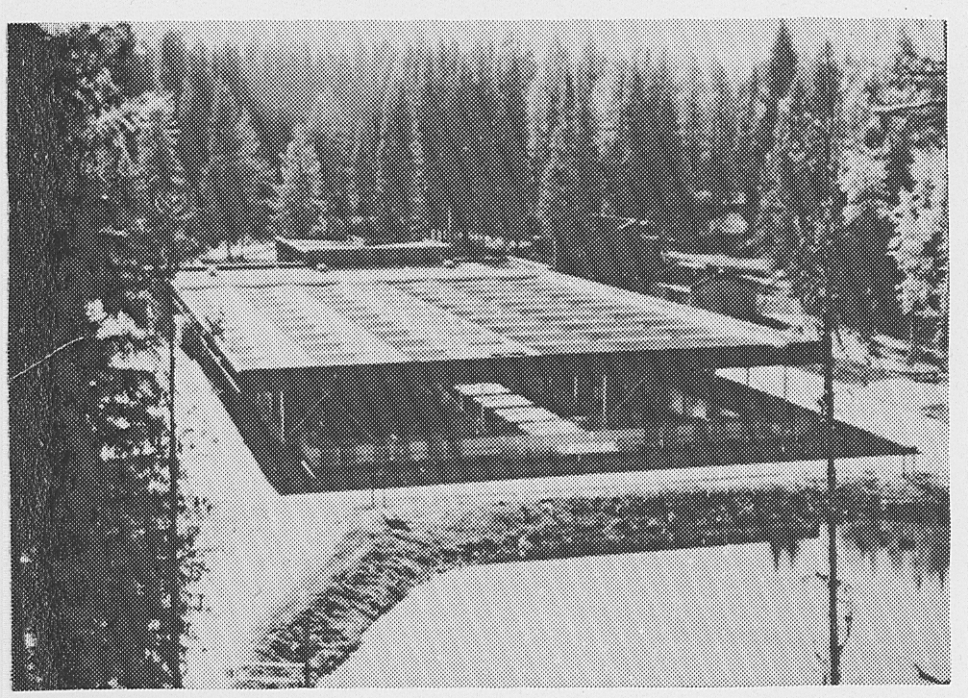
LOWER SNAKE RIVER
COMPENSATION PLAN
Hatchery Program

McCALL FISH HATCHERY

1995 Summer Chinook Salmon Brood Year Report



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ABSTRACT

The South Fork Salmon River weir and trap were installed on July 11-15, 1995, and removed at the conclusion of trapping on September 12, 1995.

Chinook salmon *Oncorhynchus tshawytscha* spawning at the trap commenced on August 10 and concluded on September 7, 1995. A total of 307 returning chinook salmon were trapped, measured, and recorded during this period. The overall average eye-up from eggs taken was 93.4%, with a total survival to release of 88.8%.

Of the 307 fish trapped: 99 were females of which 64 were ponded, 35 were trucked to the Stolle Meadows area, 6 died in the pond for a pre-spawn mortality rate of 9.3%. There were 107 adult males trapped of which 61 were ponded, 46 transported to the Stolle Meadows area, none died in the pond. There were 101 jacks trapped (according to length frequency criteria), 91 were ponded, 25 were given to the Nez Perce and Shoshone-Bannock Tribes, and 10 were transported to Stolle Meadows.

From the 64 females ponded, 57 were spawned with an average fecundity rate of 4,707 eggs per female, resulting in 268,307 green eggs taken.

During March 1997, there were 238,367 brood year 1995 smolts weighing 13,923 pounds transported and released at Knox Bridge on the South Fork Salmon River.

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INTRODUCTION

McCall Fish Hatchery was built in 1979 as a result of the Water Resources Development Act enacted by Congress in 1976. A portion of this Act is the Lower Snake River Fish and Wildlife Compensation Plan (LSRCP). The LSRCP compensates Idaho for fish and wildlife losses caused by the Lower Snake River Projects (Ice Harbor, Lower Monumental, Little Goose, and Lower Granite dams). The McCall Hatchery was the first hatchery built as a partial fulfillment of the LSRCP. Funding for LSRCP is administered to the Idaho Department of Fish and Game (IDFG) by the U.S. Fish and Wildlife Service.

The McCall Hatchery is located within the city limits of McCall, Idaho along the North Fork of the Payette River, approximately 0.16 km (1/4 mile) downstream from Payette Lake.

A satellite facility for trapping and spawning adult chinook salmon *Oncorhynchus tshawytscha is* located on the South Fork Salmon River near Warm Lake, approximately 26 miles east of Cascade, Idaho.

The main production for McCall Fish Hatchery is summer chinook reared to smolt size. There is also a resident trout program funded solely by IDFG.

The first salmon reared at the McCall Fish Hatchery were transferred in from the Mackay Fish Hatchery and the Dworshak/Kooskia National Fish Hatchery complex. These eggs were the products of adult summer chinook trapped at Little Goose and Lower Granite dams. The first eggs from the South Fork of the Salmon River were received in August 1980.

OBJECTIVES

The mitigation goal is to return 8,000 adult summer chinook salmon above Lower Granite Dam. The objectives of the McCall Fish Hatchery are:

1. Restore summer chinook salmon to the South Fork Salmon River; historically a major summer chinook stream in Idaho.

2. Trap and spawn adult salmon returning to the South Fork Salmon River.

3. Raise 1,000,000 summer chinook smolts for release into the South Fork Salmon River.

4. Work with management and research to identify optimum operating procedures for the McCall Hatchery.

FISH REARING FACILITIES

The hatchery facility consists of six buildings on approximately 15 acres. The largest building consists of a shop, parking garage, incubation and early rearing area, generator room, and feed/freezer room. The office and a three-bedroom dormitory are contained in one building. There is a visitor center with restrooms, a flow chart for a self-guided tour, and historical information signs. There are three residences for permanent personnel also located on the site.

The fish production facilities include:

1. Twenty-six eight-tray stacks of FAL (Flex-A-Lite, Consolidated) vertical flow (Heath type) incubators.

2. Fourteen concrete vats 4-ft x 40-ft x 2-ft (water depth); 320 cubic feet of rearing area per vat.

3. Two concrete rearing ponds 196-ft x 40.5-ft x 4-ft (water depth); 23,814 cubic feet of rearing space per pond.

4. One concrete collection basin 101-ft x 15-ft x 4-ft (water depth). The hatchery is designed to raise a maximum capacity of 1,000,000 smolts, averaging 17 fish per pound.

An adult trapping and spawning facility is located on the South Fork of the Salmon River near Warm Lake. This facility is equipped with a removable weir, fish ladder, trap, two adult holding ponds (10-ft x 90-ft), and a covered spawning area. Water is supplied from the South Fork Salmon River through a 33-inch underground pipeline. Holding capacity for the facility is approximately 1,000 adult salmon. Some adults are passed above the weir to spawn naturally, with an additional group transported to Stolle Meadows for Idaho Supplementation research. Eggs collected at the facility are transported "green" to McCall Fish Hatchery for incubation and rearing.

WATER SUPPLY

Hatchery water is obtained by gravity flow from Payette Lake through a 36-inch underground pipeline. Water may be taken from the surface or up to a depth of 50 feet, thus providing the capability of obtaining optimum rearing water temperatures.

Through an agreement with the Payette Lake Reservoir company, 20 cubic feet per second (cfs) of water flow is available for hatchery use. Design criteria and production goals were established using this constraint, ensuring the hatchery has enough water to meet its production goals.

Water quality analysis reveals a somewhat "distilled" system for rearing fish (Appendix 12). The pH stays about 6.8. There is no indication of problems with heavy metals and temperature is maintained at 52°F to 56°F, with a low of 37°F.

STAFFING

The hatchery is staffed with three permanent employees: a Hatchery Manager II, an Assistant Hatchery Manager, and a Fish Culturist. In addition, there are four temporary employees to assist during the busy field season.

TRAPPING AND SPAWNING

The weir and trap on the South Fork Salmon River were installed on July 11, but not fully operational until July 15, 1995 due to extremely high water. Trapping continued through September 12, 1995 with the first fish trapped on July 11. Normal trap installation is usually around June 20 with the fish arriving shortly thereafter. The peak of the run for 1995 was July 26.

There were 307 fish trapped; 99 (32.2%) were females, and 208 (67.8%) were males. A total of 101 male fish (49%) were jacks (three-year-old-fish) according to length frequency criteria. There were 35 females, 46 adult males, and 10 jacks released upstream of the weir. All of the released fish were transported to the Stolle Meadows area and released. All of the ponded fish received a numbered tag, attached to the opercle with stainless steel staples; the released fish were assigned a number but not tagged prior to release.

From the 307 fish trapped, there were 229 snouts removed from adipose-clipped (AD) fish indicating code-wire tags (CWT). These were sent to the lab in Lewiston, Idaho for tag removal.

The age-class determination by length frequency was used at the trap site during initial trapping. The CWT recovery data and scale analysis show an overlap of age classes originally determined using length frequency (Appendix 1).

Fork lengths were taken on all of the fish trapped, and all of the adult fish were injected with Erythromycin (Erythro 200) at a rate of 10 mg/kg.

There was a surplus of jacks available near the end of spawning; 25 were given to the Shoshone-Bannock Tribes, and 25 were given to the Nez Perce Tribe. There were six jacks used for spawning. Of the 101 jacks trapped, 89 were marked.

Pre-spawn mortality for the females was 9.3%, with 0% for the males. Spawn-taking activities started on August 10 and finished on September 7, 1995. There were nine spawn days during this period. A total of 268,307 green eggs were taken from 57 females for an average fecundity rate of 4,707 eggs per female. There were four unmarked females and 9 ventral clipped fish spawned for supplementation research, 44 for reserve or production fish. There were 268,307 green eggs taken. The average fecundity rate for the females was 4,707. The average eye-up rate was 93.4%. A total of 73 adult males and 6 jacks were used in the spawning operation. All eggs taken were water-hardened for one hour in a 200 ppm titrateable iodine solution prior to being transported to the hatchery. The fecundity rate is estimated at 4,500 eggs per female until the eye-up stage is reached and the eggs are enumerated. At eye-up, the eggs are shocked by siphon, picked with an electronic picker, and enumerated by displacement and an electronic counter. The overall eye-up totaled 250,599 eggs.

All of the spawned females were disease sampled by the pathologists from the Eagle Lab. There was one reserve female and two supplementation females testing positive for Bacterial Kidney Disease (BKD). Due to the low numbers of eggs available, there would be no culling of BKD positive eggs.

Incubator flows were set at a five gallon per minute rate, and incubators were loaded at 2,000 cc, or approximately 8,000 eggs per tray. If space allowed, 1,500 to 1,800 cc of eggs per tray were utilized. The eggs were treated with 1,667 ppm of formalin for 15 minutes starting three days after fertilization and continuing on a daily basis until the eggs started to hatch.

Eggs eyed-up at approximately 600 thermal units (TU) and were then shocked, picked, and enumerated. Hatching began at approximately 925 TU.

FISH PRODUCTION

Early Rearing

Fry were sent out to the concrete vats approximately three days prior to initial feeding. Initial feeding begins between 1,750 and 1,775 TU. Flows for the vats are set at 80 gallons per minute and are loaded at 30,000 to 55,000 fish per vat, depending on the number of fish on hand. The vats start at half length and are extended to full length when the density index (DI) reaches 0.30 to 0.35, usually around mid-February.

Beginning growth rates are slow, only 0.003-inch to 0.004-inch per day, due to cold water temperatures of only 37°F to 39°F. The fry are started on Bio-Diet #2 and #3 feed and remain on #3 until they reach 700 fish per pound. Bio-Diet feed has been used successfully at McCall Hatchery, using modified feed rates. The conversion rates average 1.1:1 to 1.5:1 during the fry-rearing stage.

Fish are moved to the outside rearing ponds the last week of June. They are AD, coded wire tagged and enumerated as they are moved to the ponds. Elastomer tagging was performed on a few of the supplementation fish in June, but they were too small to get a good mark. These fish were marked under the lower jaw. The rest of the supplementation fish were elastomer tagged in August and ponded. The BKD groups testing high-positive were isolated inside the hatchery building for the entire rearing cycle. All of the reserve and supplementation fish were placed in pond one. There were 221,488 fish ponded outside and 17,775 left inside for disease isolation for a total of 239,263 fish marked (Appendix 14).

The fish were fed two medicated feed treatments of Aquamycin, at 2.25 grams of active erythromycin phosphate per 100 pounds of fish at one- percent body weight.

FISH HEALTH

Diseases Encountered and Treatment

Infectious diseases in the production group and the high BKD group were not encountered during this reporting period. The production group was fed two 28 day prophylactic treatments of erythromycin medicated feed using the investigative new animal drug (INAD) 4333. The high BKD group utilized three erythromycin treatments.

Organosomatic Index

Summary of Fish Autopsy (Appendix 14).

Acute Losses

Acute losses were not experienced at this facility, during this reporting period.

Other Assessments

Historically, BKD has been a problem at this facility. Last year was the first attempt to implement a BKD segregation program at this facility. The high BKD group demonstrated the utility of segregation, suffering from long term chronic epizootic. This year, the high BKD group did not show any signs of disease and should contribute to the fishery.

FISH MARKING

The fish marking crew was here in June and August and marked 239,263 fish. These marks include CWT/AD-clips, Elastomer tags, and AD clips.

The marking crew returned in March and Passive Integrated Transponder (PIT) tagged 52,701 fish. The breakdown of tagged released fish appears in Appendix 14.

FISH DISTRIBUTION

The brood year 1995 smolt hauling operation began on March 19, 1997 with the release of the reserve and supplementation fish, and concluded on the afternoon of the March 21. There were approximately nine loads of fish hauled in three days. The river conditions were excellent for the release; the water was coming up and slightly off color. All together there were 220,729 brood year 1995 smolts at 16.72 fish per pound, and 17,656 fish at 24.42 fish per pound, totaling 238,367 fish at 13,923.3 pounds released (Appendix 10).

EXPERIMENTS

The supplementation research carried over to the brood year 1995 chinook. This project is designed in an attempt to generate more returning adults to natural spawning grounds. Supplementation smolts are the prodigy of unmarked adults. These fish were isolated within the hatchery until they could be differentially marked to ensure that genetic crossover with hatchery production fish would not occur. When these fish return as adults, a portion will be kept for spawning purposes to continue this program. There were 63,218 smolts released in the supplementation group that received an elastomer tag. These fish were released at the same time as the normal production group. The elastomer tag is a silicon type material that is inserted under the skin behind the eye. It is colored material that is highly visible under a black light. It remains flexible to allow for growth. It was used as a test to try to eliminate a ventral fin clip for the supplementation fish.

Low phosphate feed with a higher vitamin pack was utilized on the brood year 1995 fish with no adverse effects noted. This resulted in a reduction of total phosphorous in the hatchery effluent water to the minimum detectable amount (Appendix 12).

CONCLUSIONS

The brood year 1995 summer chinook released from McCall Hatchery were in excellent condition at release time. The overall survival rate to Lower Granite Dam was estimated at 29.1% based on PIT tag recoveries at the dam. The dams were spilling during the period and survival rates could be higher than estimated. The fish were slightly larger, 16.72 fish per pound as opposed to 17.8 fish per pound last year. The isolation program utilized on the BKD high-positive eggs had a positive effect on the over-all health and condition of the fish. The release pipe and tempering pump were utilized again this year. The fish transport and stocking went smoothly with fewer numbers being stocked.

RECOMMENDATIONS

Low phosphate feed with a higher vitamin pack was utilized during the peak rearing cycle with no adverse effects noted. All of the chinook eggs that tested high-positive for BKD were isolated this year and should be continued. It is recommended that culling should be implemented if sufficient eggs are available. The gabion baskets need to be replaced to make a stable footing for the weir as the existing ones have rotted out over time.

APPENDICES

Appendix 1. Age Distribution of 1995 Summer Chinook Returns to McCall Fish Hatchery, South Fork Salmon River, Based on CWT Data and Length Frequency Data.

	Males		Females	
Age	CWT* Estimate	Length/ frequency Estimate	CWT Estimate	Length/ frequency Estimate
3	101	101	0	0
4	107	88	99	91
5	0	19	0	8
Totals	208	208	99	99

*CWT data based on 131 tags recovered from 229 snouts and expanded for the entire run.
Length data is taken at trapping prior to first sort.

Age class breakdown

66cm	= 3-year-olds, jacks 67
cm - 89 CM	= 4-year-olds
90 cm	= 5-year-olds

Appendix 2. Lengths of Brood Year 1995 Fish Trapped at McCall Fish Hatchery.

Fork Length (cm)	Males	Females
37	2	0
38	2	0
39	0	0
40	1	0
41	2	0
42	0	0
43	3	0
44	1	0
45	2	0
46	4	0
47	4	0
48	5	0
49	1	0
50	7	0
51	6	0
52	11	0
53	10	0
54	8	0
55	6	0
56	9	0
57	6	0
58	3	0
59	2	0
60	4	0
61	0	0
62	1	0
63	1	0
64	0	0
65	0	0
66	0	0
67	0	0
68	1	0
69	1	1
70	0	0
71	0	0
72	1	0
73	1	3
74	4	1
75	8	0
76	4	2
77	5	1
78	3	4
79	6	8

Appendix 2. Continued.

Fork Length (cm)	Males	Females
80	8	10
81	5	19
82	12	10
83	6	12
84	8	6
85	8	3
86	2	8
87	5	3
88	4	3
89	3	0
90	4	1
91	0	1
92	3	1
93	0	0
94	0	1
95	0	0
96	1	0
97	0	1
98	0	0
99	1	0
100	0	0
101	1	0
102	0	0
103	0	0
104	0	0
105	0	0
106	0	0
107	1	0
108	0	0
109	0	0
110	0	0
111	0	0
112	0	0
113	0	0
114	0	0
115	0	0
116	0	0
117	0	0
118	0	0
119	0	0
120	1	0
Total	208	99

Appendix 3. Length Frequency for Brood Year 1995 Summer Chinook Broodstock at the South Fork of the Salmon River Trap, According to Mark Type Recorded at McCall Fish Hatchery.

Fork Length (cm)	No Mark	Lv/Rv	Ad
37	0	0	2
38	1	0	1
39	0	0	0
40	0	0	1
41	1	0	1
42	0	0	0
43	0	0	3
44	0	0	1
45	1	0	1
46	0	1	3
47	0	2	2
48	1	0	4
49	0	0	1
50	1	1	5
51	2	0	4
52	0	2	9
53	0	1	9
54	0	1	7
55	1	1	4
56	2	1	6
57	0	0	6
58	0	0	3
59	0	1	1
60	1	0	3
61	0	0	0
62	1	0	0
63	0	0	1
64	0	0	0
65	0	0	0
66	0	0	0
67	0	0	0
68	1	0	0
69	2	0	0
70	0	0	0
71	0	0	0
72	1	0	0
73	0	0	4
74	2	0	3
75	1	2	5
76	1	1	4
77	0	2	4
78	1	0	6
79	1	4	9
80	0	3	15
81	2	5	17
82	1	1	20

Appendix 3. Continued.

Fork Length (cm)	No Mark	Lv/Rv	Ad
83	2	0	16
84	1	3	10
85	0	1	10
86	0	2	8
87	1	0	7
88	1	4	2
89	0	0	3
90	1	1	3
91	0	0	1
92	2	1	1
93	0	0	0
94	1	0	0
95	0	0	0
96	0	0	1
97	1	0	0
98	0	0	0
99	1	0	0
100	0	0	0
101	0	1	0
102	0	0	0
103	0	0	0
104	0	0	0
105	0	0	0
106	0	0	0
107	1	0	0
108	0	0	0
109	0	0	0
110	0	0	0
111	0	0	0
112	0	0	0
113	0	0	0
114	0	0	0
115	0	0	0
116	0	0	0
117	0	0	0
118	0	0	0
119	0	0	0
120	1	0	0
121	0	0	0
122	0	0	0
TOTAL	38	42	227

Appendix 4. Lengths of Brood Year 1995 Fish Released by McCall Fish Hatchery.

Fork Length (cm)	Males	Females
40	0	0
41	0	0
42	0	0
43	0	0
44	0	0
45	0	0
46	0	0
47	0	0
48	1	0
49	0	0
50	0	0
51	0	0
52	0	0
53	0	0
54	0	0
55	0	0
56	1	0
57	1	0
58	0	0
59	0	0
60	0	0
61	0	0
62	0	0
63	0	0
64	0	0
65	0	0
66	0	0
67	0	0
68	0	0
69	1	0
70	0	0
71	0	0
72	0	0
73	0	0
74	3	0
75	1	0
76	1	0
77	2	0
78	1	0
79	0	0
80	1	3
81	1	3
82	1	0

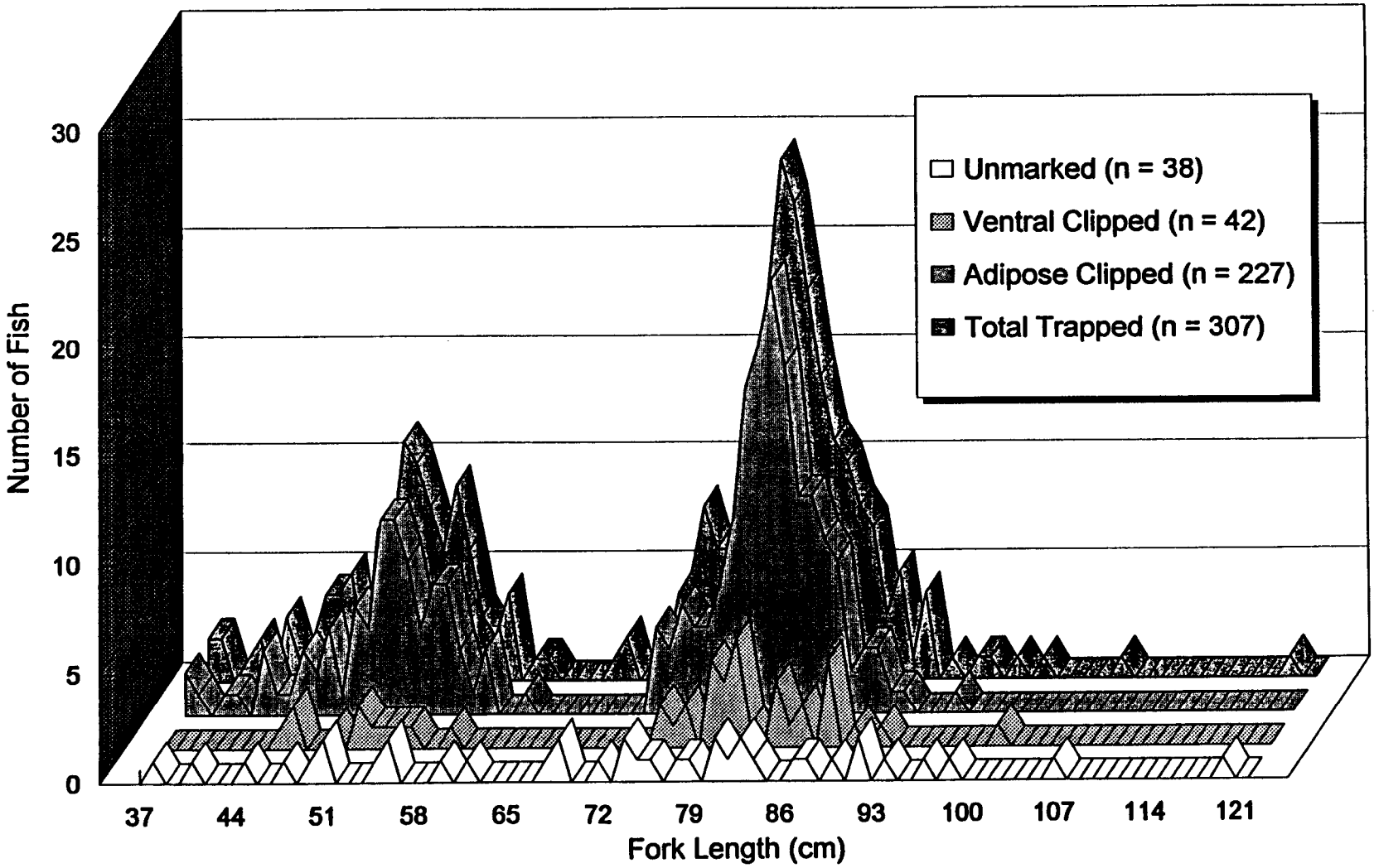
Appendix 4. Continued.

Fork Length (cm)	Males	Females
83	0	2
84	2	0
85	0	0
86	2	7
87	0	8
88	3	6
89	1	16
90	2	12
91	9	6
92	3	12
93	6	7
94	4	4
95	3	6
96	8	3
97	2	5
98	3	3
99	6	0
100	9	1
101	5	0
102	5	0
103	4	0
104	2	0
105	1	0
106	0	0
107	1	0
108	2	0
109	1	0
110	0	0
111	0	0
112	1	0
113	0	0
114	0	0
115	0	0
Totals** 98***	101	104

* Total jacks.
** These totals reflect lengths taken at trapping prior to first sort.
*** Total males not including jacks.

SFSR Summer Chinook Length Frequency - BY95

By Mark Type Trapped in FL(cm)



Appendix 6. 1995 Summer Chinook Run Timing, South Fork Salmon River, McCall Fish Hatchery.

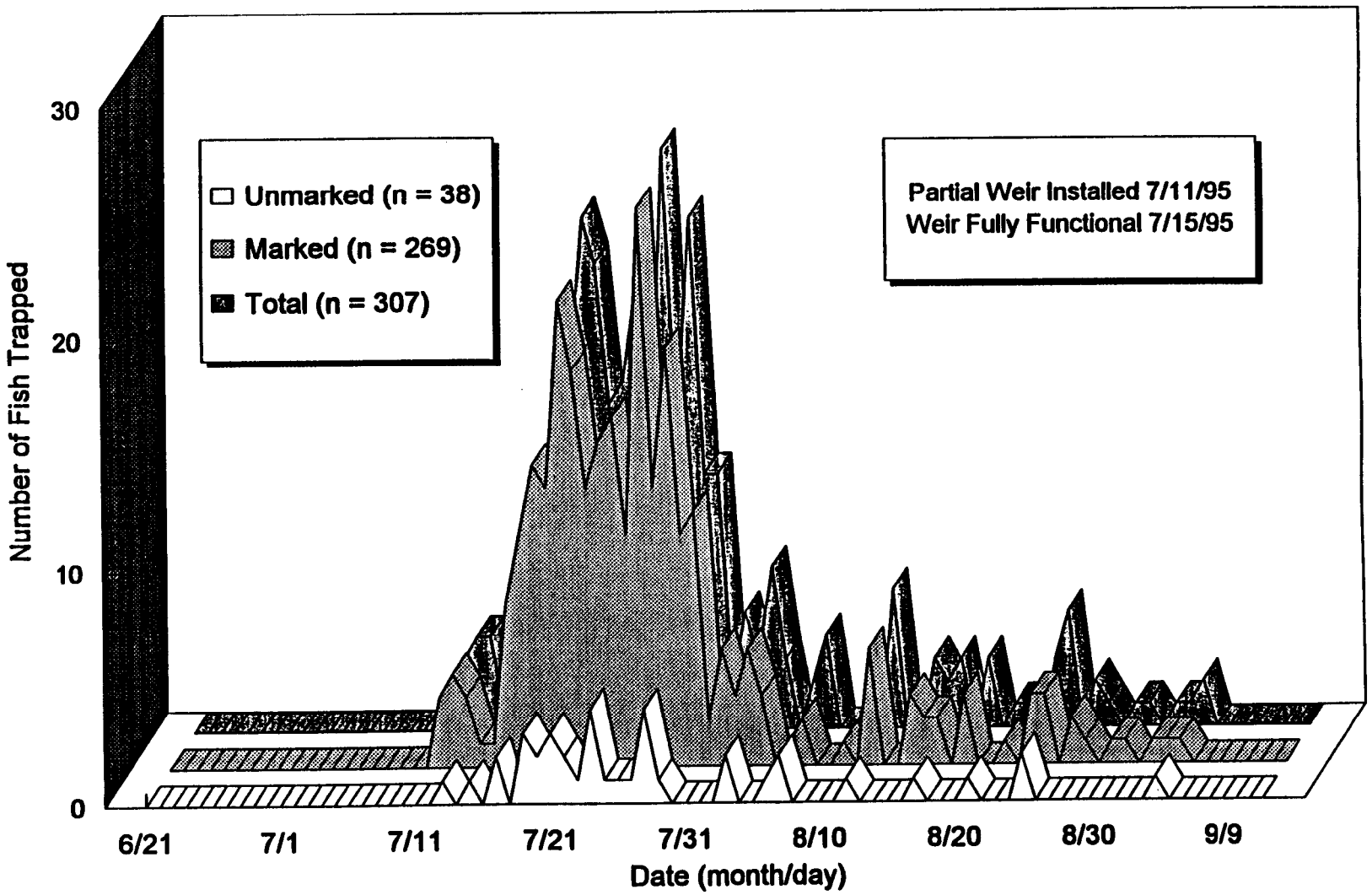
Date	Number Trapped
7/11	3
7/12	4
7/13	4
7/14	1
7/15	2
7/16	7
7/17	12
7/18	13
7/19	15
7/20	22
7/21	18
7/22	16
7/23	15
7/24	19
7/25	11
7/26	25
7/27	13
7/28	22
7/29	11
7/30	11
7/31	2
8/01	5
8/02	3
8/03	7
8/04	3
8/05	0
8/06	2
8/07	4
8/08	0
8/09	0
8/10	1
8/11	0
8/12	6
8/13	0
8/14	0
8/15	3
8/16	2
8/17	3
8/18	0
8/19	3
8/20	0
8/21	1

Appendix 6. Continued.

Date	Number Trapped
8/22	1
8/23	0
8/24	3
8/25	5
8/26	2
8/27	0
8/28	1
8/29	0
8/30	1
8/31	1
9/01	0
9/02	1
9/03	1
9/04	2
9/05	0
9/06	0
9/07	0
9/08	0
9/09	0
9/10	0
Total	307

SFSR Summer Chinook Run Timing - BY95

Daily Interval



Appendix 8. Historic Hatchery Releases and Returns Logged at McCall Fish Hatchery.

Brood year	Release Year	Number of fish	3-year-olds	Year returned	4-year-olds	Year returned	5-year-olds	Year returned	Perce returne
1978	1980	124,800	124	1981	462	1982	161	1983	0.598
1979	1981	248,926	48	1982	272	1983	221	1984	0.217
1980	1982	122,247	504	1983	713	1984	151	1985	1.119
1981	1983	183,896	595	1984	1259	1985	203	1986	1.119
1982	1984	269,880	828	1985	1265	1986	202	1987	0.850
1983	1985	564,405	1222	1986	2117	1987	893	1988	0.674
1984	1986	970,348	386	1987	1392	1988	191	1989	0.255
1985	1987	958,300	50	1988	252	1989	30	1990	0.035
1986	1988	1,060,400	495	1989	911	1990	154	1991	0.147
1987	1989	975,000	28	1990	237	1991	25	1992	0.029
1988	1990	1,032,500	821	1991	2617	1992	1311	1993	0.030
1989	1991	708,600	206	1992	1364	1993	299	1994	0.263
1990	1992	901,500	28	1993	158	1994	5	1995	0.021
1991	1993	607,298	70	1994	201	1995	37	1996	0.050
1992	1994	1,060,163	101	1995	424	1996	0	1997	---
1993	1995	1,074,598	738	1996	0	1997	0	1998	---
1994	1996	585,654	0	1997	0	1998	0	1999	---
1995	1997	238.367	0	1998	0	1999	0	2000	---

Appendix 9. Summer Chinook Distribution in the South Fork of the Salmon River Logged at McCall Fish Hatchery.

Destination	Weight	Number/pound	Number released
Knox Bridge	6,400	16.72	107,008
Knox Bridge	6,400	16.72	107,008
Knox Bridge	400	16.72	6,695
Knox Bridge*	723.3	24.42	17,656
Total Released	13,923.3		238,367

*These fish were the high BKD groups and were released last.

Appendix 10. Brood Year 1995 Chinook Survival from Green Eggs to Released Smolts.

Number of green eggs	Number of eyed eggs	Percent survival	Ponded	Percent survival	Released smolts	Percent survival
268,307	250,599	93.4	246,840	91.9	238,367	88.8%

Appendix 11. Temperature Range from August 1995 Through April 1997 at McCall Fish Hatchery.

Date	Temperature
08/95	52.1
09/95	51.0
10/95	46.7
11/95	43.9
12/95	40.3
01/96	38.8
02/96	39.0
03/96	39.0
04/96	39.5
05/96	41.5
06/96	46.5
07/96	52.8
08/96	52.8
09/96	49.7
10/96	45.2
11/96	43.3
12/96	40.5
01/97	38.5
02/97	37.5
03/97	37.5
04/97	38.0

Appendix 12. Water Analysis at McCall Fish Hatchery.

Date	pH	Ammonia	Nitrate	Nitrite	Total phosphate	Total nitrogen	KJEL hardness	$CaCO_2$ saturation	Oxygen ppm
1988	6.8	-	-	-	-	-	<10	97/103	7/10
1991		<0.05	<0.1	<0.1	<0.05	<0.10			
1993	6.9	<0.05	<0.1	<0.01	<0.05	<0.10			
1994	6.9	<0.05	<0.1	<0.01	<0.01	<0.10			

Appendix 13. Brood Year 1995 Production Cost Table.

Number of fish	Pounds of feed	Cost of feed	Pounds of fish	Conversion	Total cost	Cost/ 1,000	Cost/ pound
238,367	17,048	$20,117	13,923	1.24	$146,060	$613.00	$8.56

Appendix 14. Brood Year 1995 Marked Fish That Were Released.

Date	Number of fish marked	Mark	Purpose	Number marked fish released	Site/group release
06/24-06/27	107,501	AD	Identification	107,049	238,367
06/24-06/26	64,303	AD/CWT	US-Canada	64,160	238,367
08/1996	49,684	ELAST	Supplementation	49,502	238,367
06/26-06/27	13,768	ELAST	Supplementation*	13,716	238,367
06/27	4,007	AD	Identification*	3,940	238,367
03/97	52,701	PIT	Migration Study	52,526	238,367
Total	239,263			238,367	238,367

* High BKD groups.

Appendix 15.

SUMMARY OF FISH AUTOPSY

ACCESSION NO: 97-42 **LOCATION: mc**
SPECIES: su **AUTOPSY DATE: 03/05/97**
STRAIN: sf **AGE: juv**
UNIT: **SAMPLE SIZE: 20**
REASON FOR AUTOPSY: preliberatio
INVESTIGATOR(S): mun/bur
REMARKS: production

	MEAN	STANDARD DEVIATION	COEFFICIENT OF VARIATION
LENGTH	0.00	0.00	0.00
WEIGHT	0.00	0.00	0.00
KTL*	0.00	0.00	0.00
CTL**	0.00	0.00	0.00
HEMATOCRIT	50.20	4.84	9.64
LEUCOCRIT	0.00	0.00	0.00
SERUM PROTEIN	0.00	0.00	0.00

*EXPRESSED AT KTL TIMES 10 TO THE FIFTH POWER
**CONVERTED FROM KTL; EXPRESSED AS CTL TIMES 10 TO THE FOURTH POWER.

VALUES AS PERCENTS OF TOTAL SAMPLE

EYES		GILLS		PSEUDO-BRANCHES		THYMUS		MESEN. FAT		SPLEEN		HIND GUT		KIDNEY		LIVER		BILE	
-N	20	N	20	N	20	0	20	0	0	B	0	0	20	N	20	A	0	0	0
B1	0	F	0	S	0	1	0	1	0	R	20	1	0	S	0	B	0	1	0
B2	0	C	0	L	0	2	0	2	2	G	0	2	0	M	0	C	20	2	0
El	0	M	0	S&L	0			3	5	NO	0			G	0	D	0	3	0
E2	0	P	0	I	0			4	13	E	0			U	0	E	0		
H1	0	OT	0	OT	0	$\bar{X}$=0.00				OT	0	$\bar{X}$=0.00		T	0	F	0		
H2	0			0	0			$\bar{X}$=3.55								OT	0	$\bar{X}$=0.00	
Ml	0																		
M2	0																		
OT	0																		

SUMMARY OF NORMALS

20	19	20	20	20	20	20	20	20	0

SEX M: 0 F: 0 U: 0

GENERAL REMARKS

FINS: good **GONADS:**

SKIN: not smolting yet **OTHER:**

Submitted by:

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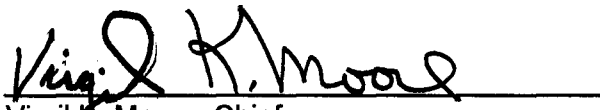
Fish Hatchery Manager II

Steven Kammeyer
Assistant Fish Hatchery Manager

Doug Munson
Fish Pathologist

Approved by:



Virgil K. Moore, Chief
Bureau of Fisheries

Tom Rogers
Fish Hatcheries Supervisor